

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



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Applicant's or agent's file reference INSCON-5(FP)	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/KR2004/002641	International filing date(day/month/year) 15 OCTOBER 2004 (15.10.2004)	Priority date (day/month/year) 15 OCTOBER 2003 (15.10.2003)	
International Patent Classification (IPC) or national classification and IPC C09J 7/02(2006.01)i			
Applicant SUH, KWANG SUCK et al			

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>10</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>	
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>	

Date of submission of the demand 07 APRIL 2005 (07.04.2005)	Date of completion of this report 07 FEBRUARY 2006 (07.02.2006)
Name and mailing address of the IPEA/KR  Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer LEE, Sun Kuk Telephone No. 82-42-481-5587 

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International application No.

PCT/KR2004/002641

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☒ This report is based on translations from the original language into the following language English which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☒ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- | | | |
|--------|--------------------------|---|
| pages | <u>1-3, 6-17, 19, 21</u> | as originally filed/furnished |
| pages* | <u>4-5, 18, 20</u> | received by this Authority on <u>11/01/2006</u> |
| pages* | <u>NONE</u> | received by this Authority on _____ |
- ☒ the claims:
- | | | |
|--------|--------------|---|
| pages | <u>NONE</u> | as originally filed/furnished |
| pages* | <u>NONE</u> | as amended (together with any statement) under Article 19 |
| pages* | <u>22-27</u> | received by this Authority on <u>11/01/2006</u> |
| pages* | <u>NONE</u> | received by this Authority on _____ |
- ☒ the drawings:
- | | | |
|--------|-------------|-------------------------------------|
| pages | <u>1</u> | as originally filed/furnished |
| pages* | <u>NONE</u> | received by this Authority on _____ |
| pages* | <u>NONE</u> | received by this Authority on _____ |
- ☐ the sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☒ The amendments have resulted in the cancellation of:
- ☒ the description, pages NONE
- ☒ the claims, Nos. 3, 7, 12
- ☒ the drawings, sheets NONE
- ☒ the sequence listing (*specify*): NONE
- ☒ any table(s) related to sequence listing (*specify*): NONE
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-2, 4-6, 8-11, 13-20	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-2, 4-6, 8-11, 13-20	NO
Industrial applicability (IA)	Claims	1-2, 4-6, 8-11, 13-20	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Reference is made to the following documents:

D1: JP 03-039379 A

D2: JP 2000-079662 A

D3: JP 09-194806 A

D4: KR 10-390527 B1 (Not cited in the ISR, but cited in the application)

1. The present invention relates to an antistatic adhesive tape comprising; a base film, a poly(3,4-ethylenedioxythiophene)-based permanent antistatic conductive layer on one surface of the base film, an adhesive layer formed on the conductive layer, and a poly(3,4-ethylenedioxythiophene)-based permanent antistatic conductive layer formed on the opposite surface of the base film. The antistatic layer may be formed by coating a mixture of a conductive polymer and a UV curing agent or a heat-curable coating agent. And a UV curing agent or a heat-curable coating agent may be coated on the antistatic layer to form a protective layer (Claims 1-2, 4, 18-19). Claim 20 is concerned with electronic parts protection film using the same. Also, the present invention relates to a method for producing said antistatic adhesive tape, which comprises; forming a poly(3,4-ethylenedioxythiophene)-based permanent antistatic conductive layer on one surface of the base film, forming an adhesive layer on the formed antistatic layer, and forming a poly(3,4-ethylenedioxythiophene)-based permanent antistatic conductive layer on the opposite surface of the base film (Claims 5-6, 8-11, 13-17).

2. D1(JP 03-039379 A) discloses a release sheet and tacky tape obtained by forming a thin film of an electrically conductive high polymer consisting of polyaniline on at least either one surface of an insulating substrate and further forming a parting agent layer thereon. (see fig. 9)

(Continued on Supplemental Box.)

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box No. V

D2(JP 2000-079662 A) discloses a highly antistatic laminate excellent in antistatic properties even under low humidity or after water immersion or molding, certainly preventing the generation of static electricity under all environments, having excellent transparency and blocking resistance, and having an extremely low deficiency of a conductive layer. The conductive layer is laminated to at least a single surface of a base material and the conductive layer is a cured layer containing a conductive polymer and a surfactant.

D3(JP 09-194806 A) discloses a coating liquid to improve the release antistatic property and the releasability of a release agent by mixing a specified high molecular release agent with a conductive aniline polymer.

D4(KR 10-390527 B1) discloses a method for preparing an antistatic layer on the surface of a base film, an adhesive tape prepared by the method and an antistatic article using the tape. The method comprises the steps of coating a conductive coating composition comprising 0.1-5 parts by weight of a conductive polymer, 10-50 parts by weight of an adhesive binder, 0.01-10 parts by weight of a surfactant and a solvent on the surface of a base film; and heating it at a temperature of 40-200 deg.C. In this case, the antistatic layer is formed by coating a mixture of a conductive polymer and an acryl binder or a urethane binder(as a UV curing agent or a heat-curable agent) on the base film. Also, the antistatic layer may be formed by polymerizing a mixture of monomers, an oxidizing agent and a dopant directly on the base film. The conductive polymer is selected from the group consisting of polyaniline, polythiophene, and 3,4-ethylenedioxythiophene.

3. Novelty (N)

Although documents D1-D3 cited in the international search report and D4 disclose an antistatic adhesive tape, the structure of the antistatic adhesive tape is slightly different from that of antistatic adhesive tape described in claims 1-2, 4, 18-19. Accordingly, the subject matters of claims 1-2, 4, 18-19 seem to be novel. Also, claims 5-6, 8-11, 13-17 on the method for producing the antistatic adhesive tape, which comprises; forming a poly(3,4-ethylenedioxythiophene)-based permanent antistatic conductive layer on one surface of the base film, forming an adhesive layer on the formed antistatic layer, and forming a poly(3,4-ethylenedioxythiophene)-based permanent antistatic conductive layer on the opposite surface of the base film must be novel, as claims 1-2 and 4 have novelty. In addition, claim 20 has novelty, because it is concerned with the electronic parts protection film using the adhesive tape manufactured according to the novel method. (Article 33(2))

(Continued on Supplemental Box.)

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

4. Inventive Step (IS)

D1 discloses the antistatic adhesive tape comprising substrate film, a conductive layer and an adhesive layer. Also, the structure of antistatic adhesive tape except for the release layer in Fig.9 of D1 is the same as that of antistatic adhesive tape described in claims 1 and 5. And the antistatic layer consisting of a mixture of a UV crosslinking agent, a release agent, a surfactant, and conductive polymer is described in D2 and D3. Also, 3,4-ethylenedioxythiophene-based antistatic conductive layer according to the present invention is described in D4. Moreover, the method for preparation of the antistatic layer according to the present invention claimed in claims 5-6, 8-11, 13-17 is easily modified by the skilled person in the art from D1-D4. Consequently, as mentioned above, D1-D4 do not individually disclose all of the features of the present invention claimed in claims 1-2, 4-6, 8-11, 13-20, but when combined, it would be obvious to a person skilled in the art to arrive at all of the features of claims 1-2, 4-6, 8-11, 13-20. Therefore, the invention claimed in claims 1-2, 4-6, 8-11, 13-20 is not considered to involve an inventive step.(Article 33(3))

5. Industrial Applicability (IA)

The present invention is considered to be industrially applicable.(Article 33(4))

[Disclosure]**[Technical Problem]**

Accordingly, studies with relation to an adhesive tape which overcomes the above-mentioned shortcomings are needed.

5 Namely, an adhesive tape is needed in which static electricity does not occur even when the tape is attached to or detached from the surface of electronic parts, and in which the solvent resistance of the opposite surface of the tape is excellent while the antistatic property of both

10 surfaces can be permanently maintained.

[Technical Solution]

An object of the present invention provides a permanent antistatic adhesive tape in which one surface of the tape can have a surface resistivity in the range of 10^6 -

15 10^{11} ohms/square (Ω/\square) by forming a conductive polymer-based antistatic layer on the surface and an adhesive layer thereon, and the opposite surface can have a controllable surface resistivity in the range of 10^3 - 10^{10} Ω/\square , by forming

20 a conductive polymer-based hard coating layer on the opposite surface, and at the same time, has excellent resistance to various solvents.

[Advantageous Effects]

The adhesive layer in the adhesive tape according to

the present invention can have a controllable surface resistivity in the range of 10^6 - 10^{11} Ω/\square and does not cause static electricity when the tape is detached from a surface of the parts to which it had been stuck or attached. Also, the antistatic hard coating layer formed on the surface opposite to the adhesive layer can have a controllable surface resistivity in the range of 10^3 - 10^{10} Ω/\square and has excellent resistance to various solvents. Thus, the adhesive tape according to the present invention can permanently maintain its antistatic property on both surfaces.

[Description of Drawings]

FIG. 1 is a cross-sectional view of an antistatic adhesive tape according to a preferred embodiment of the present invention.

15 [Best Mode]

In order to achieve the above object, the present invention provides an antistatic adhesive tape comprising a base film and, on one surface of the base film, 1) a conductive polymer-based conductive layer and an adhesive layer formed on the conductive layer, or 2) a layer formed of a mixture of a conductive polymer and an adhesive agent.

Also, the present invention provides an antistatic adhesive tape with hard coating property comprising a base film and, on one surface of the base film, 1) a layer

10 g of poly(3,4-ethylenedioxythiophene) dispersion,
30 g of 30% methoxymethylamide solution, 0.2 g of para-
toluenesulfonic acid, 0.01 g of Zonyl (Dupont Co.), and 0.2
g of ethylene glycol were dissolved in 60 g of a mixture
5 solution of ethyl alcohol and isopropyl alcohol. The
resulting solution was coated on a polyester film then
dried at 100 °C for 2 minutes. The film thus produced had a
surface resistivity of $10^5 \Omega/\square$ and an adhesion of 5B as
measured according to an ASTM D3359 standard test method.
10 Also, the produced film was 98% transparent at wavelength
of 550 nm. After the film was coated with an adhesive
component and left to stand for 5 days, it showed a
resistivity of $10^5 \Omega/\square$.

Also, an epoxy adhesive layer was formed on the
15 produced conductive polymer layer in a thickness of 5 μm .
The surface resistivity of the adhesive layer was measured
to be $10^8 \Omega/\square$.

Example 2

3.5 mmol of 3,4-ethylenedioxythiophene, 8.1 mmol of
20 ferric toluenesulfonate, and 2.3 mmol of ethanol were
dissolved in 15 g of ethanol. The solution was coated on a
polyester film in a thickness of 1.5 μm then placed in a
heat-circulating oven at 100 °C for 2 minutes so as to
induce a reaction. After completion of the reaction, the
25 film was taken out of the oven and its surface was washed
with ethyl alcohol and dried, thus producing a transparent

Example 4

30 parts by weight of a poly(3,4-ethylenedioxythiophene) dispersion (Baytron PH, Bayer) and 20 parts by weight of a UV curable hard coating agent (UC150H, Uray, Korea) which was dissolved in 70 parts by weight of isopropyl alcohol. The solution was coated on the surface of a polyester film, which was opposite to a surface applied with an adhesive agent. The coated material was dried at 60 °C for 1 minute and then cured in a UV coater.

The produced film had a surface resistivity of $10^7 \Omega/\square$. When the produced film was rubbed 20 times with cleanpaper saturated with acetone, there is no damage to the surface of the film.

Example 5

10 g of 3,4-ethylenedioxythiophene (Baytron PH, Bayer GmbH, Germany), 29 g of an urethane binder (U710, ALBERDINGK, Germany), 1 g of a melamine curing agent, 0.5 g of ethylene glycol, 0.5 g of N-methyl pyrrolidone, and 0.01 g of a fluorine-based surfactant were mixed in isopropyl alcohol to a total of 100 parts by weight. The resulting dispersion was coated on the surface of a polyester film, opposite to the surface applied with an adhesive agent. On the coated material, a UV curing agent (UC150H, Uray, Korea) was coated as a protective coating layer in a thickness of 1 μm . The resulting film was dried at 60 °C

[CLAIMS]**[Claim 1]** (amended)

An antistatic adhesive tape comprising;

a base film,

5 a poly(3,4-ethylenedioxythiophene)-based permanent
antistatic conductive layer on one surface of the base
film ,

an adhesive layer formed on the conductive layer, and

10 a poly(3,4-ethylenedioxythiophene)-based permanent
antistatic conductive layer formed on the opposite surface
of the base film.

[Claim 2] (amended)

The antistatic adhesive tape of Claim 1, wherein the
adhesive layer on the opposite surface is formed by a
15 mixture of a conductive polymer and an adhesive agent.

[Claim 3] (deleted)**[Claim 4]** (amended)

The antistatic adhesive tape of Claim 1 or 2, wherein in order to impart a protective property to the antistatic layer on the opposite surface, a UV curing agent or a heat-curable coating agent is coated on the antistatic layer to
5 form a protective layer, or the antistatic layer is formed by a mixture of a conductive polymer and a UV curing agent or a heat-curable coating agent.

【Claim 5】 (amended)

10 A method for producing an adhesive tape, which comprises,

forming a poly(3,4-ethylenedioxythiophene)-based permanent antistatic conductive layer on one surface of a base film,

15 forming an adhesive layer on the formed antistatic layer, and

forming a poly(3,4-ethylenedioxythiophene)-based permanent antistatic conductive layer on the opposite surface of the base film.

20

【Claim 6】 (amended)

The method of Claim 5, wherein the adhesive layer on the opposite surface is formed by a mixture of a conductive polymer and an adhesive agent.

【Claim 7】 (deleted)

【Claim 8】

The method of Claim 5, which comprises, on the
5 antistatic layer formed on the opposite surface, either
forming a protective layer formed of a UV-curing agent
containing a UV-curable binder, or hard-coating a mixture
of a curing agent, a conductive polymer and a UV-curable
binder, so as to impart a hard coating property to the
10 antistatic layer.

【Claim 9】

The method of Claim 5, wherein in order to form the
protective layer on the antistatic layer on the opposite
surface, a heat-curable binder and a curing agent are added
15 to the conductive polymer, or the conductive polymer is
applied on the antistatic layer and then a heat-curable
coating agent containing a heat-curable binder is applied.

【Claim 10】

The method of Claim 8 or 9, wherein the heat-curable
20 binder or the UV-curable binder contains a component with a
release property.

【Claim 11】

The method of any one of Claims 5, 6, 8 and 9,
wherein a surfactant with a release property is used in the
antistatic layer on the opposite surface so that an
5 adhesive agent does not adhere to the antistatic layer.

【Claim 12】 (deleted)

【Claim 13】 (amended)

The method of any one of Claims 5, 6, and 8, wherein
the antistatic layer is formed by coating a composition
10 containing a conductive polymer solution and a binder as
main components the one surface of the base film.

【Claim 14】 (amended)

The method of any one of Claims 5, 6, and 8, wherein
the antistatic layer is formed by polymerizing a mixture of
15 monomers, an oxidizing agent and a dopant directly on the
base film so as to synthesize a conductive polymer.

【Claim 15】 (amended)

The method of any one of Claims 5, 6 and 8, wherein
the antistatic layer is formed by a vapor phase

polymerization method in which an oxidizing agent and a dopant are coated on the base film, and then vapor phase monomers are brought into contact with the coated materials.

5 **【Claim 16】** (amended)

The method of any one of Claims 5, 6 and 8, wherein the adhesive agent is coated in a thickness of 0.001-30 μm .

【Claim 17】 (amended)

10 The method of any one of Claims 5, 6, and 8, wherein the base film is made of a polymer selected from polyethylene, polyester, polyimide, polystyrene, polyether, polyethersulfone, polyacryl (methacryl), cellulose polymers, cyclic olefin polymers and copolymers thereof.

【Claim 18】 (amended)

15 An adhesive tape produced by a method set forth in any one of Claims 5, 6 and 8.

【Claim 19】

20 The adhesive tape of Claim 18, which further comprises an antistatic treated release film attached to one surface of the tape.

【Claim 20】

A film with a permanent antistatic property for protecting electronic parts, such as LCDs, which is produced using the tape of Claim 18.